Remarks

Claims 1-22 were previously pending in this application. By this amendment, Applicants have amended claims 1, 6, 7, and 16-19. Claims 13-15, and 20-22 have been canceled. New claims 23-30 have been added, including new independent claim 23 which is based upon previously presented claim 13. As a result, claims 1-12, 16-19, and 23-30 are currently pending for examination, with claims 1, 7, and 23 being independent claims. No new matter has been added.

In general, the claims have been amended to further clarify and highlight the batch feature of the present invention. Support for these amendments is found throughout Applicants' application as originally filed, for example, at page 6, lines 21-24; page 7, lines 16-19; page 11, lines 22-25; page 13, lines 17-20; page 15, lines 7-8; page 16, line 19 to page 17, line 6; and FIGS. 2 and 6.

Summary of Telephonic Interview with Examiner Soohoo

Applicants thank the Examiner for the April 4, 2006 interview during which the undersigned emphasized the batch feature of the present invention. Examiner Soohoo advised that clarification of the claimed methods and structures, to more positively recite a batch feeding and dumping of the mixture from the blend chamber when the desired mixture is obtained, would further highlight this feature. The undersigned agreed to point to corresponding terminology and support for the phrases currently subject to rejection under 35 U.S.C. § 112, first paragraph. Finally, with regard to the election/restriction requirement, Examiner Soohoo suggested incorporating the concept of time-based control in the form of dependent claims.

Election/Restriction Requirement

Applicants respectfully disagree with the Examiner's assertion that claims 13-15 and 20-22 are directed to an invention that is independent or distinct from the invention originally claimed, in that claims 1-22 share a common inventive concept. Specifically, the common inventive concept is a method of mixing materials to achieve a desired blend by analyzing and controlling characteristics of the mixture.

Nonetheless, in the interest of facilitating prosecution of this application, Applicants herein cancel claims 13-15 and 20-22, with traverse. The concept of time-based control has been reincorporated in the form of dependent claims as suggested by the Examiner in the telephonic interview of April 4, 2006 summarized above.

Rejection Under 35 U.S.C. § 112, First Paragraph

The final Office Action rejected claims 16-20 under 35 U.S.C. § 112, first paragraph. As discussed in the telephonic interview of April 4, 2006, Applicants will herein point to specific support corresponding to the claim terms, remaining after this Amendment, which are subject to the rejection. As a preliminary matter, claims 1, 16 and 17 have been amended to remove the numeric identifiers associated with the control signals, a decision motivated by the simple fact that these labels are not used elsewhere in the dependent claims to reference back. Additional claim elements have been relabeled for clarity. Furthermore, new claims 28-30 have been added to further clarify the manner in which certain control signals of the present invention function to adjust the rate at which the second material is added to the mixture.

A "control signal to the second valve to control the amount of the second material received at the second inlet to achieve the desired concentration of the second material in the mixture" is supported throughout Applicants' application as originally filed. For example, support for this recitation may be found on page 6, lines 21-24; page 9, lines 16-17; page 11, lines 5-21; page 14, line 22 to page 15, line 6; FIG. 2 ("% Solids LOOS (Low Out of Specification)? -> Yes -> Add Chemical"); and FIG. 6. (see multiple occurrences of "Chem 1 Inlet Valve Actuated" and "Chem 1 Inlet Valve De-actuated" in response to various LOOS values registered by sensor).

A "control signal, responsive to the detected amount of the second material in the mixture being greater than the desired concentration, to dispense a portion of the mixture out the drain port" is supported throughout Applicants' application as originally filed. For example, support for this recitation may be found on page 7, lines 16-18; page 11, lines 22-32; page 15, lines 9-18; page 19, line 21; FIG 2 ("% Solids HOOS (High Out of Specification)? -> Yes -> Purge"); and FIG. 7 ("Conductivity HOOS? -> Yes -> Drain Valve Actuated").

A "control signal, responsive to the detected amount of the second material in the mixture being the desired concentration, to dispense a bulk of the mixture at the desired concentration of the second material in the mixture from the blend chamber through the outlet" is supported throughout Applicants' application as originally filed. For example, support for this recitation may be found on page 15, lines 7-8; page 16, line 20; page 17, lines 19-20; and FIG. 2 ("% Solids LOOS? -> No -> % Solids HOOS? -> No -> Dist. Tank Low? -> Yes -> Transfer *OR* No -> Chem Demand? -> Yes -> Dispense"); FIG. 8 ("Conductivity in Spec? -> Yes -> Dist. Tank Low? -> Yes -> ChemOut Valve Actuated"); and FIG. 9 ("Conductivity in Spec? -> Yes -> Dist. Tank Low? -> No -> Chemical Demand? -> Yes -> ChemOut Valve Actuated").

Support for a "desired concentration" or a "final blend value" is found, for example, at page 11, lines 22-23; page 15, lines 7-8; and FIG. 2 ("% Solids LOOS? -> No -> % Solids HOOS? -> No").

Support for a "first intermediate concentration" is found, for example, at FIG. 6 ("LOOS < 80%?"). The first intermediate concentration may be any concentration below the desired concentration in a stepped process.

Support for a "second intermediate concentration" is found, for example, at FIG. 6 ("LOOS < 95%?"). The second intermediate concentration may be any concentration below the desired concentration in a stepped process.

Support for a "third intermediate concentration" is found, for example, at FIG. 6 ("LOOS < 99%?"). The third intermediate concentration may be any concentration below the desired concentration in a stepped process.

Support for a "first predetermined time period" is found, for example, at page 15, lines 1-6; and FIG. 6 (see first occurrence of "Blend LOOS Timer Done?").

Support for a "second predetermined time period" is found, for example, at page 15, lines 1-6; and FIG. 6 (see second occurrence of "Blend LOOS Timer Done?").

A "control signal to the second valve to control the amount of the second material received at the second inlet to achieve a first intermediate concentration of the second material in the mixture" is supported throughout Applicants' application as originally filed. For example, support for this recitation may be found on page 11, lines 5-14; and FIG. 6 ("LOOS < 80%? -> Yes -> Chem 1 Inlet Valve Actuated").

A "control signal to the second valve to remain closed for a first predetermined time period" is supported throughout Applicants' application as originally filed. For example, support for this recitation may be found on page 15, lines 1-6; and FIG. 6 (see first occurrence of "Blend LOOS Timer Done? -> No").

A "control signal to the second valve to adjust the amount of the second material received at the second inlet to achieve a second intermediate concentration of the second material in the mixture" is supported throughout Applicants' application as originally filed. For example, support for this recitation may be found on page 11, lines 5-14; and FIG. 6 (see first occurrence of "Blend LOOS Timer Done? -> Yes -> Chem 1 Inlet Valve Actuated").

A "control signal to the second valve to remain closed for a second predetermined time period" is supported throughout Applicants' application as originally filed. For example, support for this recitation may be found on page 15, lines 1-6; and FIG. 6 (see second occurrence of "Blend LOOS Timer Done? -> No").

A "control signal to the second valve to adjust the amount of the second material received at the second inlet to achieve a third intermediate concentration of the second material in the mixture" is supported throughout Applicants' application as originally filed. For example, support for this recitation may be found on page 11, lines 5-14; and FIG. 6 (see second occurrence of "Blend LOOS Timer Done? -> Yes -> Chem 1 Inlet Valve Actuated").

Finally, support for the phrase "out of specification mixture" can be found, for example, at page 7, lines 16-18; page 11, lines 23-25; page 15, lines 9-18; FIG. 2 ("% Solids HOOS? -> YES"); and FIG. 7 ("Conductivity HOOS? -> YES").

Rejection Under 35 U.S.C. § 102(b)

The final Office Action rejected claims 7-12 and 18-19 under 35 U.S.C. § 103(a) as being anticipated by U.S. Pat. No. 3,161,203 to Hathorn et al. (hereinafter "Hathorn") in view of US2002/0048213 to Wilmer et al. (hereinafter "Wilmer"). The ambiguity of this rejection presented under a 35 U.S.C. § 102 heading was clarified by the undersigned in a prior telephonic inquiry to Examiner Soohoo on March 31, 2006. During that telephone conference, the Examiner indicated that the rejection should have been under 35 U.S.C. § 102(b) over Hathorn. Applicants accordingly respond as though claims 7-12 and 18-19 were rejected under 35 U.S.C.

§ 102(b) over Hathorn, as intended by the Examiner. Although Applicants disagree with this rejection, independent claim 7 has been amended to more clearly patentably distinguish over Hathorn.

Hathorn is directed to a continuous blend and dispense method for providing a mixture of oil and sand constituents for flow through a conduit system in hydraulic fracturing of earth formations. (Col. 1, lines 10-15). The liquid component enters mixing receptacle 3 via conduit means 4 and the solid component enters mixing receptacle 3 via conduit means 5. (Col. 2, lines 61-66). A portion of the composite medium is reintroduced into mixing receptacle 3 along first and second branch conduit means 12, 17 to obtain uniform and complete suspension of the solid component without mechanical blending devices. (Col. 3, lines 15-17, 26-29; col. 4, lines 52-54, 65-69).

Density meter 13 of Hathorn, installed in second branch conduit means 17, measures the density of the composite mixture and transmits a signal to a controller 14 which, in turn, transmits an operating signal to valve positioner 15 which determines the position of valve 16 to regulate the rate at which the solid component enters mixing receptacle 3 in order to maintain a predetermined density level of the composite mixture provided to well head 7. (Col. 3, lines 26-41).

In Hathorn, "the flow of the liquid component entering the system, which is determinative of the solid component inflow, is regulated to maintain the combined component inflow entering the system equal to the medium outflow." (Col. 2, lines 17-20; col. 4, lines 10-20). A liquid level measuring cell 18, positioned in mixing receptacle 3, issues a pneumatic signal proportional to the deviation of the medium level from a predetermined point to a second controller 19 which, in turn, transmits an operating signal to valve positioner 20 which determines the position of valve 21 to cause the inflow rate of liquid component along conduit means 4 necessary to maintain the predetermined level within mixing receptacle 3. (Col. 3, lines 59-67).

Applicants maintain, as previously argued in response to the Office Action of August 9, 2005, that Hathorn fails to disclose, teach, or suggest a method of blending wherein a first material is provided in bulk to a blend chamber as recited in claim 7. As noted above, Hathorn discloses a continuous blend and dispense process to provide a composite mixture of oil and sand

to a well head. Unlike in the batch process of the present invention, neither the oil nor sand is initially provided to the blend chamber in bulk. According to Hathorn, "the flow of the liquid component entering the system, which is determinative of the solid component inflow, is regulated to maintain the combined component inflow entering the system equal to the medium outflow." (Col. 2, lines 17-20; col. 4, lines 10-20). Likewise, the flow rate of sand to the blend chamber is controlled to maintain a predetermined density level of the composite mixture. (Col. 3, lines 26-41).

Furthermore, Hathorn fails to disclose, teach, or suggest a method as recited in amended claim 7, comprising the act of dispensing a bulk of the mixture at the desired concentration. One advantage of the present invention is that the mixture is not dispensed unless the mixture has achieved the desired concentration. As such, the system of the present invention does not dispense mixture that is out of specification, unlike Hathorn that continuously dispenses the composite mixture via conduit means 6. (Col. 2, lines 67-69).

Because Hathorn fails to disclose, teach, or suggest the act of providing a first material in bulk to a blend chamber, and because Hathorn further fails to disclose, teach, or suggest the act of dispensing a bulk of the mixture at the desired concentration, claim 7 patentably distinguishes over Hathorn.

Claim 8-12, and 18-19 depend from claim 7 and patentably distinguish over Hathorn for at least the same reasons. Accordingly, reconsideration and withdrawal of this rejection is respectfully requested.

Rejections Under 35 U.S.C. § 103(a)

The final Office Action rejected claims 1-3, 6 and 16-17 under 35 U.S.C. § 103(a) as being unpatentable over Hathorn in view of Wilmer. Applicants respectfully disagree.

Wilmer is directed to a method and apparatus for blending and supplying process materials, particularly ultra-high purity chemicals, abrasive slurries and the like. (Col. 1, lines 11-14). Process materials from material supply lines 18 may continuously pass into static mixer 22 for mixing. (Col. 12, lines 36-37). Instruments, such as a densitometer, may be positioned upstream of the static mixer to assure acceptable material is being transmitted to the static mixer

22. (See Col. 7, lines 27-30). The blend of process materials may be supplied on a continuous basis, without interruption. (Col. 5, lines 2-4).

One skilled in the art would not have modified Hathorn, by providing a drain as shown by Wilmer, to enable dispensing of unwanted and unacceptable mixtures because to do so would render the system of Hathorn unsuitable of its intended use. As previously discussed, Hathorn is directed to a blend and dispense process that continuously delivers the composite mixture to a tool via conduit means 6, even if out of specification. Significantly, the process is designed to "enable well injection rates on the order of 40 to 50 barrels per minute of treating medium." (Col. 1, lines 27-30). Due to this continuous high volume demand, there is no motivation to provide a drain to dispose of unwanted mixtures because to do so would compromise the ability of the system to meet the output requirements. Indeed, precision of the mixture in Hathorn is of lesser importance in view of the volumetric flow rate demand. Unlike the present invention which allows for correction of an out of specification blend prior to dispensing in bulk, Hathorn, at best, can limit lag time between detection and correction of deviations from predetermined proportions of components in the continuously dispensed composite mixture.

Finally, even if Hathorn and Wilmer could be combined in the manner suggested by the Examiner, amended independent claim 1 still patentably distinguishes thereover because the proposed combination lacks at least one limitation recited in claim 1. Specifically, neither Hathorn nor Wilmer teach or suggest a batch mixing system comprising a controller configured to provide a control signal, responsive to the detected amount of the second material in the mixture being the desired concentration, to dispense a bulk of the mixture at the desired concentration of the second material in the mixture from the blend chamber through the outlet. The mixture in mixer 22 of Wilmer cannot be further adjusted if it is out of specification, because it continuously exits the mixer. Wilmer can adjust the input of materials so that the blend leaving mixer 22 eventually changes, but only after sufficient time has passed for the input to pass to the outlet under continuous operating conditions. Indeed, both Hathorn and Wilmer are directed to continuous (not batch) mixing systems. As such, Wilmer fails to cure the deficiencies of Hathorn.

Independent claim 1 is therefore patentable over both Hathorn and Wilmer, either alone or in combination. Claims 2-3, 6 and 16-17 depend from claim 1 and are patentable for at least

the same reasons. Accordingly, reconsideration and withdrawal of this rejection is respectfully requested.

The final Office Action rejected claims 7-12 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. No. 5,516,423 to Conoby et al. (hereinafter "Conoby") in view of Hathorn.

As a preliminary matter, Applicants wish to direct the Examiner's attention to the language of independent claim 7, a method claim, the scope of which appears to be inconsistent with the stated grounds for rejection.

Conoby is directed to a continuous stirred tank reactor (CSTR) for the treatment and discharge of liquid, such as aqueous waste effluent. More specifically, Conoby is directed to a variable residence time treatment system to manage sudden spikes in the flow rate and concentration of liquid to be treated. (Col. 1, lines 6-12; col. 4, lines 13-22). A stream of liquid to be treated is received by reactor tank 12 at inlet port 18 and exits via discharge port 63, the position of which establishes the minimum holding volume of reactor tank 12. (Col. 6, lines 55-56). Sensor 22 positioned in reactor tank 12 provides a pH signal 23 to controller 30. (Col. 5, lines 26-27). Output of controller 30 actuates metering pumps 36, 40 to control the feed of reagents to reactor tank 12 in order to achieve a predetermined pH level of the liquid. (Col. 5, lines 52-59; col. 7, lines 8-10).

One skilled in the art would not have been motivated to provide a batch mixing system, as in the present invention, upon reading Conoby. According to Conoby, "batch reactor systems are disadvantaged in that they typically require greater holding volume than do CSTR systems." (Col. 1, lines 26-27). Conoby further states, "[i]n accordance with the invention, a single-tank CSTR system can be used with its attendant cost and space savings, for treating a liquid stream of variable volume, composition and/or concentration." (Col. 4, lines 15-19). One skilled in the art would have been directed away from the batch system of the present invention, not toward it.

Likewise, Hathorn fails to offer any teaching, suggestion or motivation to provide a batch mixing method. As discussed above, Hathorn is directed to a continuous blend and dispense process for providing a mixture of oil and sand constituents for flow through a conduit system in hydraulic fracturing of earth formations.

Finally, even if Conoby and Hathorn could be combined as suggested by the Examiner, independent claim 7 still patentably distinguishes thereover because the proposed combination would lack at least one claim limitation recited in claim 7. Specifically, and as previously argued in response to the Office Action of August 9, 2005, neither Conoby nor Hathorn teach or suggest providing a first material in bulk to a blend chamber. Furthermore, neither Conoby nor Hathorn teach or suggest dispensing a bulk of the mixture at the desired concentration as recited in amended claim 7. As such, Hathorn fails to cure the deficiencies of Conoby and any case of *prima facie* obviousness is rebutted.

Accordingly, independent claim 7 is patentable over Conoby and Hathorn, either alone or in combination. Claims 8-12 depend from claim 7 and are patentable for at least the same reasons. Accordingly, reconsideration and withdrawal of this rejection is respectfully requested.

The final Office Action rejected claims 1-6 and 16-17 under 35 U.S.C. § 103(a) as being unpatentable over Conoby in view of Hathorn, as applied to claim 7, and further in view of Wilmer.

This rejection relies upon the improper combination of Conoby and Hathorn, as discussed above, and should therefore be withdrawn for lack of a *prima facie* case of obviousness.

Furthermore, even if the combination was proper, independent claim 1 still patentably distinguishes thereover because the proposed combination would lack at least one limitation recited in claim 1. Specifically, none of the cited references disclose, teach, or suggest a controller that provides a control signal, responsive to the detected amount of the second material in the mixture being the desired concentration, to dispense a bulk of the mixture at the desired concentration of the second material in the mixture from the blend chamber through the outlet. As such, both Hathorn and Wilmer fail to cure deficiencies in Conoby, and any case of *prima facie* obviousness is rebutted.

Accordingly, independent claim 1 is patentable over Conoby, Hathorn and Wilmer, either alone or in combination. Claims 2-6 and 16-17 depend from independent claim 1 and are therefore patentable for at least the same reasons. Applicants respectfully request reconsideration and withdrawal of this rejection.

Conclusion

In view of the foregoing amendments and remarks, reconsideration is respectfully requested. This application should now be in condition for allowance; a notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicants' attorney at the telephone number listed below.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicants hereby request any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 50/2762.

Respectfully submitted,

Jeffrey A. Wilmer et al., Applicants

By: _____

Lisa E. Winsor, Reg. No. 44,405
LOWRIE, LANDO & ANASTASI, LLP
One Main Street
Cambridge, Massachusetts 02142
United States of America
Telephone: 617-395-7000
Facsimile: 617-395-7070

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